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METHOD OF WORKING THE PITTSBURGH SEAM.

A PLAN OF WORKING TO ECONOMICALLY AND SAFELY REMOVE ALL THE COAL.

BY JOSEPH W. BLOWER, COLUMBUS, O.

It will be generally admitted by those financially and officially interested in working the Pittsburgh seam, that a larger percentage of the coal in the seam should be taken out, and that, owing to the limited supply of timber and its great cost, other means must soon be adopted to secure the roof.

The present systems of mining are: 1.) As shown on the accompanying plan on No. 1 entry, with 21 feet rooms and 12 to 13 feet pillars, and 2.) as shown on No. 3 entry with 27 feet rooms and 6 to 7 feet pillars, which are left permanently.

The method shown on No. 1 entry is favorable only when the cover is light, so that the falls can be controlled easily when the ribs or pillars are drawn. The coal, when worked by this plan, should have well defined facing and end joints, so that no powder is used in its extraction. Under such conditions, from 90 to 95 per cent. of the coal has frequently been taken out. Such conditions, however, are the exception now and not the rule. Conditions quite the reverse are found after No. 2 Pool on the Monongahela river is passed. Then the system shown on No. 3 entry is almost universally adopted, because greater losses of coal were experienced when the other method was tried. The 12 feet pillars being crushed to slack by falls and squeezes, and frequently lost altogether. The squeeze extending over a large area when it had once set in and occasionally closed the entry also. The method shown on No. 3 entry is therefore preferable under the existing conditions.

The rooms in both systems are laid off to run only 75 yards and breakthroughs are made every 35 yards, or less if necessary, and about \$1.00 per 1000 bushels of coal mined is required for timber. (Posts, caps, etc.) Breakthroughs cost 50 cents per yard and are very unsatisfactory for ventilating purposes. In nine cases out of ten they are the direct cause of the rooms closing, and burying large quantities of coal even when the system as shown on No. 1 entry is worked fairly successfully. Break-

throughs are not usually paid for when the rib or pillar is only 6 feet thick, for, when the rooms are advanced nearly far enough to need a breakthrough, the miner commences "gripping" out in order to thin the rib, and finally a hole is put through, which the gob partly fills up again. These breakthroughs are generally made in a straight line, parallel with the entry. Sometimes twenty or thirty rooms are working together, with a few at the beginning of the entry finished which begin to "cave." This "cave" having free access by way of the breakthroughs to the other rooms, often effects a number of them also. As some of these have only been worked two-thirds of their intended length when this occurs, the officials say, "we can get this coal from the other entry." But the same conditions are met there and the coal is often irretrievably lost. Of course the owner does not know this, generally for two reasons: First, because he does not often personally go into the mine, and second, because, owing to a false idea of economy, the entries only are surveyed, the rooms being placed on the map approximately. The excuse given is, "the business is not profitable enough to give the surveyor any more work than what is actually necessary to comply with the letter of the law, and to prevent working land outside of the lease or mine property." Acres of coal are thus lost, the room pillars alone representing about 20 per cent. of the coal in the seam, and frequently the entry pillars are also left in.

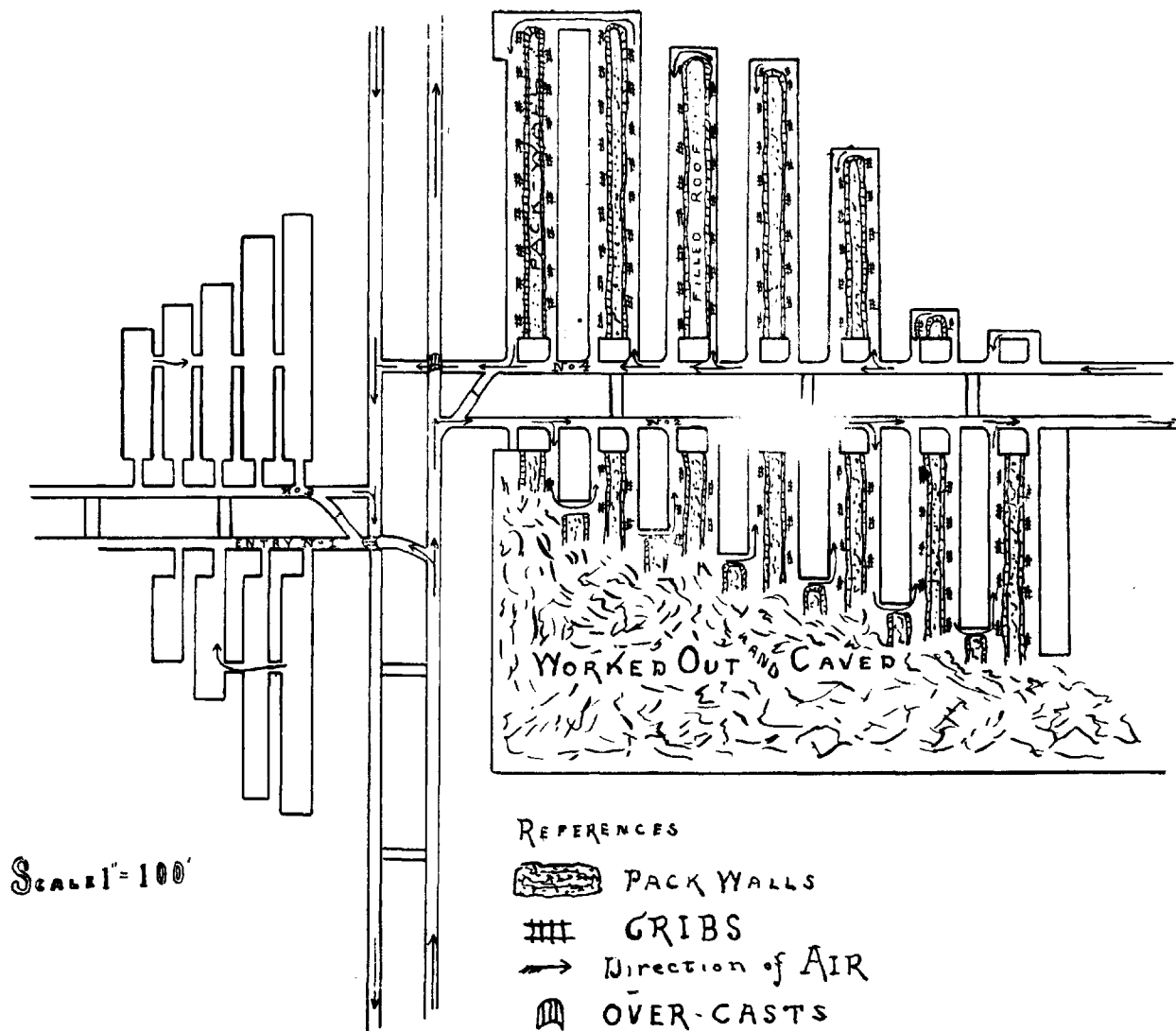
The disadvantages of the present methods will, I think, be very generally admitted, and they may be summed up as follows:

1. Only 70 to 75 per cent. of the coal is extracted, while the expense necessary to extract the whole has been incurred.

2. The cost of timber is too great, and owing to its limited supply, new methods must eventually be adopted.

3. Breakthroughs are expensive (when paid for), and inefficient sources of ventilation, and they are the direct causes of rooms caving prematurely.

To remedy these, the plan of working, as shown on entries 2 and 4 is suggested. I think it will be found very satisfactory for the Pittsburgh seam, and especially for it as found on the Third Pool of the Monongahela, and in fact at any place where it is possible to post the roof, providing there is sufficient *debris* to build the necessary pack-walls. No change is made in the entries or in the laying off the rooms. Two rooms are connected, leaving the same amount of entry stump as under the old methods. The track is run along side each rib making the room 39 feet wide, and a pillar 27 to 29 feet wide, with a track on each side of it. The refuse, which amounts to one-third of the seam will be packed to the roof between the tracks, filling



up about 20 feet of the width of the room forming an artificial brattice, by which the air can be circulated around the face of the rooms, and which also form the support of the roof. If not sufficient *debris* is found in the rooms, the slate from entries and rooms being turned can be taken in and gobbled. It will be seen that the ribs will be left intact, and posts are not used, except temporarily for slate, cribs taking their places. These cribs are placed every ten yards apart, beginning at 5 yards from the entry stump on the side of the room whose rib will be drawn first. The cribs on the other side beginning 19 yards from the entry stump. The advantage of the arrangement is apparent on inspection of the plan. If the pack-walls are built properly, these cribs will not be necessary until the rib is drawn back, but the best plan is to set them as the room is being driven. They may be built of old posts, ties, wooden rails, etc., with a foundation of say of 9 to 12 inches of slack, and wedged up tight to the roof. The necessity for the slack will be best shown on their removal, as they can then be undermined easily. It also allows them to give a little as the weight upon them is increased.

It is generally known that these rooms will not "cave" when 39 feet wide, but the roof coal will "sag" sufficiently to make the packed gab air tight.

In bringing back the rib, small cribs made from wooden rails about $2\frac{1}{2}$ feet long, set on a base of slack, can be used. A few posts may also be necessary.

Another pack-wall may be brought down with the rib, as shown on plan, which will prevent any fall taking place, and a gradual subsidence will only occur, and no large reservoir for the accumulation of gas will be formed.

Ribs brought back in this way will be "long-wall retreating" on a small scale, and in case it is found that a roadway can be carried along the face of these ribs, every two alternate rooms could be left, and the coal worked back in this way, making a face length of 94 feet, more or less, as circumstances may allow. Or the room may be made wider, and the car taken along the face of the room. The tracks would be safe, having one solid rib side, and pack-walls and cribs on the other. Conditions existing would soon prove what modification of the general plan could be made. It will be seen that rooms can be driven an indefinite distance without fear of caving, and it will pay to drive them a minimum distance of 100 yards or longer, if it will pay to haul one car further. Besides five pairs of entries will only be needed where six pairs are required by present methods.

The proposed system will be found applicable where "soot seams" affect the roof and coal.

I have found by experience that double rooms were safer and required less timber in proportion to width than narrow rooms, and that while entries and narrow rooms would cave until the roof had arched itself, the wide rooms allowed sufficient sag to relieve the pent-up gas, or they may be allowed to break in the center.

For machine mining, the plan suggested, has a longer face length to work upon with no unnecessary moving of the machine. The machine can be set down on one side of the room and work its way across. The truck in the meantime being changed to the other side, ready to transfer the machine elsewhere.

Another advantage will be that the miners will work double, and in this way reduce the length of time the room will be in operation. Fewer tight shots will be needed, some of the labor of bearing in will be reduced and better coal will be secured.

In my opinion many accidents occur when miners work singly, which would not occur if the men worked together. Men are often hurt and unable to report the accident, which becomes more serious on account of the lack of timely assistance.

It will, no doubt, be said that the system proposed is impracticable, and that the rooms will cave, but this will not be found true if the pack-walls are properly built, and any one acquainted with long-wall work will substantiate me.

But, suppose the rooms did cave. The ribs or pillars are large enough to allow a skip, say 12 or 15 feet wide, to be taken out and thus the face of the room can be reached and finished, or the remaining portion of the rib may be brought back and no coal will be lost.

The advantages claimed for this system are:

1. The extraction of all the coal.
2. A reduction in cost of timber.
3. The ventilation of the working faces without incurring the cost of the ruinous and inefficient breakthroughs.
4. It requires fewer entries, and as a consequence less rubbing surface, thereby producing better ventilation with the same expenditure of power.
5. Large accumulations of fire damp will be avoided, if the *debris* is properly utilized.
6. The miners will have a wider room, better ventilation, and will use less powder.
7. The system is better adapted for machine mining.
8. The mine foreman or his assistants, when making the required visits to working places will have only half as great a distance to travel.

I hope those interested will give the subject a careful investigation, and if in their opinion the system is practicable, try it in one entry at least. I do not claim the idea is perfect in detail. Some modifications due to local conditions may be necessary, but these will soon suggest themselves to a practical official.

Can the Pittsburgh seam be worked by Longwall—is a question often asked. If this system is tried the answer will come, and it will not entail the risks of Longwall advancing. It certainly can be worked by Longwall retreating, but no one is prepared to the first expense.

SECRETARY HASELTINE: Mr. Blower, will you please explain the plan to us in detail?

Thereupon Mr. Blower explained his plan in detail, illustrating it from the plan on the black board.

SECRETARY HASELTINE: Mr. President, I move that we extend to Mr. Blower a vote of thanks for his very able paper.

The motion being seconded prevailed.

THE CHAIR: The next paper to be read is Prof. Sperr on "Split Air Courses vs. Continuous Currents."